

### **REMARKS**

The Office Action dated October 24, 2006, has been received and carefully noted. The above amendments and the following remarks are being submitted as a full and complete response thereto.

Entry of this Response is proper under 37 C.F.R. §1.116 since this Amendment: (a) places the application in condition for allowance for reasons discussed herein; (b) does not raise any new issue regarding further search and/or consideration since the Amendment amplifies issues previously discussed throughout prosecution; (c) does not present any additional claims without canceling a corresponding number of finally-rejected claims; and (d) places the application in better form for appeal, should an appeal be necessary. Entry of the Amendment is thus respectfully requested.

By this response, no claims have been amended. Claims 7, 11, and 13 are currently pending in the application and are subject to examination.

#### **Rejection Under 35 U.S.C. § 103(a)**

Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Shibata et al. (JP 04-042582, hereinafter "Shibata") in view of Brunner (U.S. Patent No. 5,742,098) and further in view of Blonder et al. (U.S. Patent No. 4,914,667, hereinafter "Blonder"). Claim 7 is also rejected under 35 U.S.C. § 103(a) as being unpatentable over Wegleiter et al. (U.S. Patent No. 6,531,405, hereinafter "Wegleiter") in view of Blonder.

Claims 11 and 13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Shibata in view of Brunner and further in view of Blonder as applied to Claim 7 and Nishiwaki et al. (Japanese Patent Application Publication No. 59085868 A, hereinafter

"Nishiwaki"). Claims 11 and 13 are also rejected under 35 U.S.C. § 103(a) as being unpatentable over Wegleiter in view of Blonder, and further in view of Nishiwaki. The Applicants respectfully traverse the rejections.

Claim 7 recites a light emitting diode comprising a pellet, a major front surface, of which where an electrode is formed, is made of a GaAsP mixed crystal, characterized in that the **major front surface is a rough surface, and that all side surfaces of the pellet are rough surfaces, wherein the rough surfaces are formed with fine projections having a diameter in a range of 0.3 $\mu$ m to 3  $\mu$ m.**

Claim 11 recites a fabrication process for a light emitting diode having a pellet, a major front surface of which, where an electrode is formed, is made of a GaAsP mixed crystal, characterized in that the pellet is treated with an etching solution of an aqueous solution containing Br<sub>2</sub>, nitric acid, hydrofluoric acid, and acetic acid or I<sub>2</sub>, nitric acid, hydrofluoric acid, and acetic acid to form **fine projections on the major front surface and all side surfaces of the pellet, wherein the fine projections have a diameter in the range of 0.3 $\mu$ m to 3  $\mu$ m.**

The Office Action cites Shibata as allegedly disclosing a light emitting diode comprising a pellet. The Office Action admits that Shibata fails to teach or suggest that "all the side surfaces of the pellet are roughened on the sides, and that the projections have [a] diameter of the claimed range" (see Office Action, page 3).

The Office Action cites Brunner and Blonder as allegedly curing these deficiencies, citing that Brunner allegedly teaches an LED with 3 side surfaces roughened, and Blonder allegedly teaches a device having a rib structure with projections in the claimed

range, however Brunner and Blonder do not cure the deficiencies outlined above with respect to Shibata.

With respect to Claims 11 and 13, Nishiwaki is cited by the Office Action as allegedly teaching an etching agent such as a Br<sub>2</sub> or I<sub>2</sub> aqueous solution, however Nishiwaki does not cure the deficiencies of Shibata, Wegleiter, Brunner, or Blonder, as outlined herein and above.

With respect to the rejections under Wegleiter, the Applicants submit that Wegleiter cannot be combined with the applied prior art to arrive at the present invention. The Applicants are preparing experimental data in the form of a Declaration Under 37 C.F.R. § 1.132 to show that the process of Wegleiter does not produce a roughened surface as recited in the claims, namely **fine projections on the major front surface and all side surfaces of the pellet, wherein the fine projections have a diameter in the range of 0.3μm to 3 μm**. Specifically, this Declaration will provide experimental and photographic evidence that the etching procedure of Wegleiter and the experimental procedure of the present invention provide substantially different results. Applicants intend to file this Declaration as soon as it is completed.

The light emitting diode and the fabrication process according to the present invention are substantially different from the light emitting diode and fabrication process of Wegleiter. Thus, the Applicants submit that Wegleiter, alone or in combination with Blonder, or any other of the applied prior art, fails to teach or suggest at least **fine projections on the major front surface and all side surfaces of the pellet, wherein the fine projections have a diameter in the range of 0.3μm to 3 μm**.

The Applicants thus submit that it would not have been obvious to modify the applied prior art to teach the claimed invention. Accordingly, Shibata, Brunner, Blonder, Wegleiter, and Nishiwaki, alone or in any combination thereof, do not teach or suggest all the elements of Claims 7 and 11.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. M.P.E.P. § 2143.03. For at least the reasons provided above, Applicants submit that Shibata, Brunner, Blonder, Wegleiter, and Nishiwaki, either alone or in combination, do not teach or suggest all the elements of Claims 7 and 11. Accordingly, the Applicants respectfully submit that Claims 7 and 11 are allowable over the applied prior art. As Claim 11 is allowable, the Applicants submit that dependent Claim 13 is likewise allowable for at least the same reasons Claim 11 is allowable, as well as for the additional subject matter recited therein.

Under U.S. patent practice, the U.S. Patent and Trademark Office has the burden under 35 U.S.C. §103 to establish a *prima facie* case of obviousness. In re Fine, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Both the case law of the Federal Circuit and the U.S. Patent and Trademark Office itself have made clear that where a modification must be made to the prior art to reject or invalidate a claim under 35 U.S.C. §103, there must be a showing of proper motivation to do so. The mere fact that a prior art reference could arguably be modified to meet the claim is insufficient to establish obviousness. The U.S. Patent and Trademark Office can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. Id.

In order to establish obviousness, there must be a suggestion or motivation in the reference to do so. See also In re Gordon, 221 U.S.P.Q. 1125, 1127 (Fed. Cir. 1984) (prior art could not be turned upside down without motivation to do so); In re Rouffet, 149 F.3d 1350 (Fed. Cir. 1998); In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999); In re Lee, 277 F.3d 1338 (Fed. Cir. 2002).

Blonder, cited in all prior art rejections, is not analogous art, and that the Office Action has failed to set forth a *prima facie* case of obviousness because the Office Action has failed to provide sufficient motivation to combine Blonder with the cited prior art references.

In order to rely on a reference under 35 U.S.C. § 103, a reference must be analogous art. In order to qualify as analogous art, a reference must either be in the field of the applicant's endeavor, or if not, then be reasonably pertinent to the particular problem to be solved by the invention. See M.P.E.P. § 2141.01(a)(I). When determining whether a reference is analogous art, similarities and differences in structure and function of the inventions carry the most weight.

In this instance, the present invention is directed to a light emitting diode and fabrication process. Shibata is directed to a light emitting diode array. Brunner is directed to a generic semiconductor component. Wegleiter is directed to a process for producing a light-emitting semiconductor body. Blonder, however, is directed to a hybrid laser for optical communications.

The Office Action cites the waveguide layer 23, with rib structure projections, each rib approximately 3  $\mu\text{m}$  wide. However, the waveguide layer 23 is part of a Bragg

reflector component of a laser assembly. The function of the waveguide layer 23 is to directionally reflect the light emitted by the laser, and increase the reflected light through constructive interference. In contrast, the present invention teaches that the projections are formed in order to be locally convex surfaces. The roughened surfaces of the presently claimed invention provide that light emitted at an angle larger than the critical angle of total reflection is transmitted into the air instead of being reflected back into the crystal, thus increasing the total amount of emitted light.

Thus, the Applicants submit that Blonder is not analogous art as required by M.P.E.P. § 2141.01(a), and thus Blonder cannot be used to establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a).

Further, the Office Action has not set forth a proper teaching or suggestion to combine the Shibata and Brunner or Wegleiter with the teaching of Blonder. M.P.E.P. § 2143.01 provides that if a proposed modification would render the prior art unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. Modifying Wegleiter or Shibata and Brunner with Blonder, in addition to failing to teach or suggest the presently claimed invention, would also render the prior art unsatisfactory for its intended purpose.

In the present invention, the fine projections are formed on the interface to create locally convex surfaces which are smaller than the critical angle of total reflection. Light reaching the surface at an angle larger than the critical angle of total reflection interfaces with these locally convex surfaces, and instead of being reflected back into the pellet,

emits out into the air, increasing the light output of the LED (see Specification, page 6, lines 8-14).

Similarly, in Brunner, the microscopic tooth structure 5 provides an improved coupling because of reduced total reflection losses at a boundary between the semiconductor body 2 and the plastic sheath 8 (see Brunner, col. 3, lines 22-27). In Wegleiter, the advantageous effect achieved by the roughness of the surface is that, in comparison with a planar surface, a larger proportion of the radiation generated in the semiconductor body impinges on the surface of the semiconductor layer at an angle which is smaller than the critical angle of total reflection (see Wegleiter, col. 2, lines 38-43). In Shibata, when the inclined surfaces are formed on the surface 58, the incident angle of light from the diffusion area 56 to the light emitting surface 58 varies, and light can escape even at an angle at which the light would be totally reflected in the conventional way (see Shibata, Abstract).

In contrast, in Blonder, the waveguide layer 23 cited by the Examiner surrounds facet 19 of the laser-active portion, and acts as a Bragg reflector. The Bragg reflector increases the reflective properties of the surface by causing many reflections which combine in constructive interference, thus increasing the intensity of the light reflected. In other words, the waveguide layer 23 of Blonder is designed to efficiently reflect light in a different direction, while the structures of Brunner, Shibata, Wegleiter, and the present invention are designed to allow emitted light at extreme angles to pass through a barrier, rather than be reflected back to the source. These purposes are contrary, and combining

Blonder with any of the applied prior art references would render the references unsatisfactory for their intended purpose.

Thus, the Applicants submit that a *prima facie* case of obviousness has not been established.

Consequently, in view of all of the above and the Declaration Under 37 C.F.R. 1.132, the Examiner is requested to kindly reconsider the rejections and withdraw the same.

### **Conclusion**

Applicants respectfully submit that this application is in condition for allowance and such action is earnestly solicited. If the Examiner believes that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below to schedule a personal or telephone interview to discuss any remaining issues.



In the event that this paper is not being timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to Counsel's Deposit Account Number 01-2300, referencing Docket Number 107242-00005.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "S. C. Olive", written over a horizontal line.

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